**Indicator: Preterm Delivery (212)**

Preterm delivery is defined as delivery prior to 37 weeks of gestation (a typical pregnancy lasts 40 weeks). The shorter the gestational age of an infant, the more likely (s)he is to suffer adverse effects. Preterm birth along with low birthweight is the second leading cause of infant death, and is associated with nearly half of all neurological birth defects (Martin et al., 2003).

Maternal high risk conditions (e.g., infertility problems, vaginal spotting, inadequate maternal weight gain), maternal previous history, socioeconomic status, smoking, alcohol consumption before third trimester, and multiple gestation pregnancy are major risk factors for preterm delivery. Environmental contaminants (e.g., lead) continue to be studied to better understand the likely associations with preterm delivery (Blackmore and Rowley, 1994).

This indicator presents the proportion of U.S. infants born prior to 37 weeks of gestation, based on natality data reported to the National Vital Statistics System. The NVSS registers virtually all deaths and births nationwide with data coverage from 1933 to present and from all 50 States and the District of Columbia.

**What the Data Show**

The proportion of infants defined as preterm has risen 14% since 1990 (Martin, et al. 2003). Figure 212 presents preterm delivery percentages for the U.S. and each of the 10 EPA Regions for the years 1995-2001. A general increase has been observed from 1995 (10.9%) to 2001 (11.8%). The rate in 2002 was 11.9% (Martin et al., 2003). Moderately preterm births (infants born 32-36 weeks gestation) account for the bulk of the rise for 2001–2002; the percent of infants born very preterm (less than 32 weeks) was essentially unchanged at 1.96% in 2002 and 1.95% in 2001(Martin et al., 2003).

Like the national data, the number of preterm deliveries has increased over time for each of the 10 EPA Regions from 1995 to 2001 (Figure 212). In 1995, the number of preterm deliveries across the 10 EPA Regions ranged from 8.6 % (Region 10) to 12.4% (Region 4). In 2001, the number of preterm deliveries across the EPA Regions ranged from 9.8% (Region 10) to 13.5% (Region 4).

Preterm delivery has been observed to be higher among Black mothers compared to White and Hispanic mothers. Between 1999-2002, preterm delivery among Black mothers ranged from a low of 17.1% (2000) to 17.4% (1999, 2001, 2002). During that same time period, preterm delivery among White mothers ranged from 10.5% (2000) to 11.0% (2002) and Hispanic mothers ranged from 11.0% (2000) to 11.4% (2002) (Martin et al., 2003).

**Indicator Limitations**

- "The primary measure used to determine the gestational age of the newborn is the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth." This measurement is subject to error, including imperfect maternal recall or misidentification of the LMP because of postconception bleeding, delayed ovulation, or intervening early miscarriage These data are edited for LMP-based gestational ages, which are clearly inconsistent with the infant's plurality and birthweight, but reporting problems for this item persist and may occur more frequently among some subpopulations and among births with shorter gestations (Martin et al., 2003).

- Preterm delivery data were extracted from the CDC WONDER database. Slight differences in percentages were obtained compared to reports by Martin et al. (2003). The source of these differences in unknown.

- Natality data are not available for the U.S. territories in CDC WONDER. Thus, Regions 2 and 9 are calculated to include only States.

**Data Source**

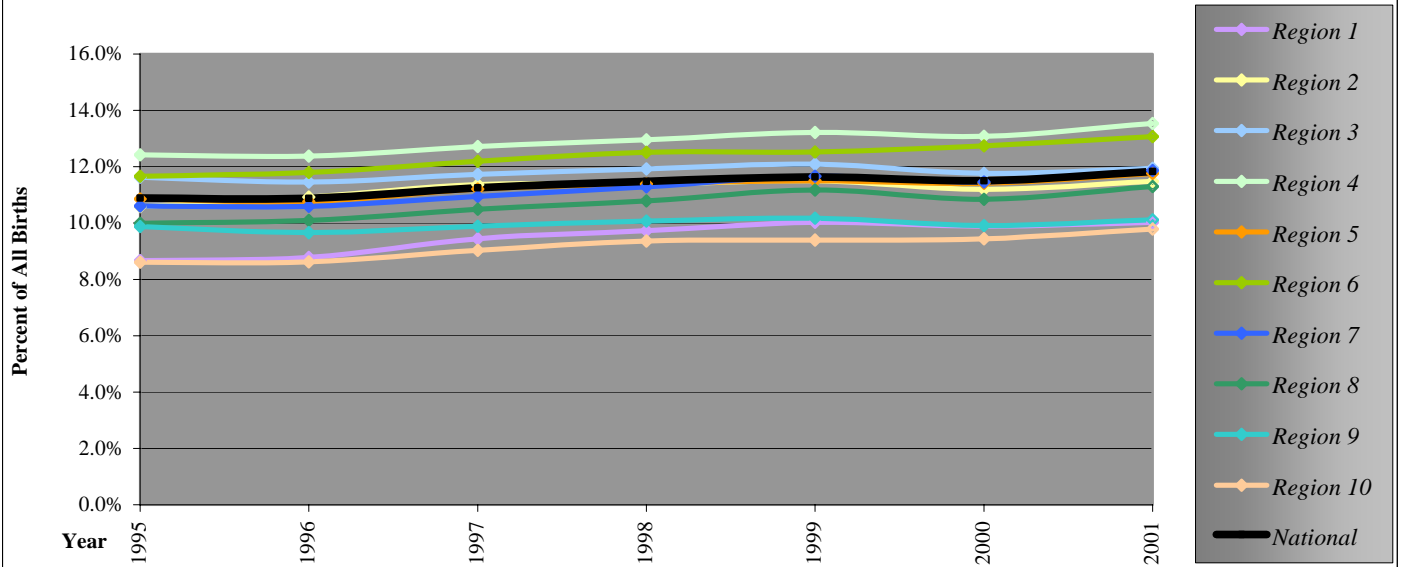CDC. CDC WONDER: Natality Data Request. http://wonder.cdc.gov/nataJ.html

**References**

Blackmore CA, Rowley DL. 1994. Preterm Birth. eds. Wilcox LS and Marks JS.In. From Data to Action CDC's Public Health Surveillance for Women, Infants, and Children CDC's Maternal & Child Health Monograph 1994. Center for Disease Control: Atlanta, GA.

Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, and Munson ML. 2003. "Births: Final Data for 2002." *National Vital Statistics Reports*, 52(10) Hyattsville, Maryland: National Center for Health Statistics. Last accessed: November 22, 2004. http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_10.pdf

**Graphics**



Figure 212. Percentage of Preterm Delivery (<37 weeks gestations), total U.S. and 10 EPA Regions, 1995-2001

**R.O.E. Indicator QA/QC**

**Data Set Name:** PRETERM DELIVERY
**Indicator Number:** 212 (89087)
**Data Set Source:** CDC, NCHS
**Data Collection Date:** ongoing
**Data Collection Frequency:** yearly
**Data Set Description:** Preterm Delivery
**Primary ROE Question:** What are the trends in human disease and conditions for which environmental pollutants are thought to be to risk factors including across population subgroups and geographic regions?

**Question/Response**

**T1Q1** Are the physical, chemical, or biological measurements upon which this indicator is based widely accepted as scientifically and technically valid?

Yes. The National Vital Statistics System (NVSS) is the oldest and most successful example of inter-governmental data sharing in Public Health and the shared relationships, standards, and procedures form the mechanism by which NCHS collects and disseminates the Nation's official vital statistics. The methodology for collecting vital statistics is standardized and outlined in Model State Vital Statistics Act and Regulations Revised April 1995, DHHS publication (PHS) 95-1115 (http://www.cdc.gov/nchs/data/misc/mvsact92aacc.pdf). Preterm delivery is defined as <37 completed weeks of gestation, and is measured in frequency and rate.

**T1Q2** Is the sampling design and/or monitoring plan used to collect the data over time and space based on sound scientific principles?

Yes. The National Vital Statistics System is responsible for the Nation s official vital statistics. These vital statistics are provided through State-operated registration systems. Standard forms for the collection of data and model procedures for the uniform registration of the events are developed and recommended for State use through cooperative activities of the States and the NCHS (http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf). U.S. Standard Birth Certificates are revised periodically. Most state certificates conform closely in content and arrangement to the standard certificate recommended by NCHS and all certificates contain a minimum data set specified by NCHS. One section of the Standard Birth Certificate is reserved for gestational age. The mother provides demographic information on the birth certificate, such as race and ethnicity, at the time of birth. Medical and health information is based on hospital record.

**T1Q3** Is the conceptual model used to transform these measurements into an indicator widely accepted as a scientifically sound representation of the phenomenon it indicates?

Yes. The data collected by NVSS are routinely referenced and used in epidemiological studies. Regional data: The raw numbers for each state were downloaded from the CDC WONDER natality database (http://wonder.cdc.gov/nataJ.html). The raw numbers for each state within a region were combined and percentages for each region calculated.

**T2Q1**  To what extent is the indicator sampling design and monitoring plan appropriate for answering the relevant question in the ROE?

Virtually all births are registered with the NVSS nationwide. The temporal coverage of the data is from 1933 to present. Data are collected from all 50 States including the District of Columbia.

**T2Q2**  To what extent does the sampling design represent sensitive populations or ecosystems?

The data set has nationwide birth reporting, including sensitive populations.

**T2Q3**  Are there established reference points, thresholds or ranges of values for this indicator that unambiguously reflect the state of the environment?

Not applicable

**T3Q1**  What documentation clearly and completely describes the underlying sampling and analytical procedures used?

The sampling and quality assurance information can be found in Model State Vital Statistics Act and Regulations Revised April 1995, DHHS publication (PHS) 95-1115 (http://www.cdc.gov/nchs/data/misc/mvsact92aacc.pdf). Documentation is also available at http://wonder.cdc.gov/wonder/help/nata.html Data source for Table HH3: CDC. CDC WONDER: Natality Data Request. http://wonder.cdc.gov/nataJ.html

**T3Q2**  Is the complete data set accessible, including metadata, data-dictionaries and embedded definitions or are there confidentiality issues that may limit accessibility to the complete data set?

The data can be accessed up to the county level through the electronic data warehouse for CDC at http://wonder.cdc.gov/nataJ.html. Individual level data are not available due to confidentiality issues.

**T3Q3**  Are the descriptions of the study or survey design clear, complete and sufficient to enable the study or survey to be reproduced?

Yes. Virtually all births from the 50 states, including District of Columbia, submit birth data to the NVSS at NCHS. The recommended birth certificate is posted at http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf. The documentation for the birth set is at http://wonder.cdc.gov/wonder/help/nata.html.

**T3Q4**  To what extent are the procedures for quality assurance and quality control of the data documented and accessible?

See answer to T3Q1

**T4Q1**  Have appropriate statistical methods been used to generalize or portray data beyond the time or spatial locations where measurements were made (e.g., statistical survey inference, no generalization is possible)?

Not applicable

**T4Q2**  Are uncertainty measurements or estimates available for the indicator and/or the underlying data set?

Not applicable

**T4Q3**  Do the uncertainty and variability impact the conclusions that can be inferred from the data and the utility of the indicator?

Not applicable

**T4Q4**  Are there limitations, or gaps in the data that may mislead a user about fundamental trends in the indicator over space or time period for which data are available?

The primary measure used to determine the gestational age of the newborn is the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth (Martin et al., 2003). This measurement is subject to error, including imperfect maternal recall or misidentification of the LMP because of postconception bleeding, delayed ovulation, or intervening early miscarriage. These data are edited for LMP-based gestational ages, which are clearly inconsistent with the infant's plurality and birthweight, but reporting problems for this item persist and may occur more frequently among some subpopulations and among births with shorter gestations. Regional Data: Natality data are not available for the U.S. territories in CDC WONDER. Thus, Regions 2 and 9 are calculated to include only States.

# Generation of Regional Natality Rates

**Data set name(s):** Indicator Graphs
Low Birth Weight by EPA Region
Very Low Birth Weight by EPA Region
Preterm Delivery by EPA Region

**Data set date(s):** 1995-2001 (data available at time of query)

**Data source:** CDC. WONDER Natality file1995–2001.
http://wonder.cdc.gov/nataJ.html

**Data description:**
Natality indicators are defined as:
Low Birth Weight (0-2,499 grams)
Very Low Birth Weight (0-1,499 grams)
Preterm Delivery (0-36 weeks gestation)

Downloading and organizing the data:

Natality data were accessed through CDC's WONDER database (http://wonder.cdc.gov/).

We downloaded a raw data file containing the following data fields: year of birth; state of maternal residence; count of all births; count of "low birth weight" births (0-2,499 grams); count of "very low birth weight" births (0-1,499 grams); and count of "preterm delivery" births (0-36 weeks).

The regional data file was produced by aggregating natality data for the 50 states and the District of Columbia into the ten EPA regions to obtain the total number of births and natality indicator counts for each region, by year. No natality data were available for U.S. territories. (For a map of the EPA regions, refer to http://www.epa.gov/epahome/whereyou-live.htm.)

An Excel worksheet was produced for each natality indicator displaying either, the percentage of births that were defined as low birth weight, very low birth weight, or preterm delivery, by EPA region for the years 1995 – 2001. All cases for a given indicator (e.g., very low birth weight) are summed by year within each region.

No adjustments (e.g., calculating age-adjusted rates) to the raw data were required for the natality dataset.

Rates are expressed as percentages and calculated by dividing the number of observations in each of the regions (e.g., low birth weight babies) by the total number of births in the corresponding regions and multiplying by 100.